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FLOWERS, FRUITS, AND LEAVES

Flowers, Fruits, and Leaves. By Sir John Lubbock, Bart., M.P., &c. "Nature Series." (London: Macmillan and Co., 1886.)

THE President of the Linnean Society sets a good example. Not many men, we suppose, have more onerous or more multifarious duties than he. He earns his leisure, little though it be, and he makes excellent use of it. Flowers, fruits, and leaves, to say nothing of insects and archæological investigations, supply him with the recreation he needs, provoke his observation, and stimulate his intelligence. More than that, they make him a propagandist. He is anxious to share with others the pleasure and relief he obtains from the study of Nature. To this end he descends from the Presidential chair to converse familiarly on the objects of his study, not only with those who are already in sympathy with him, but with those benighted Philistines whom perchance he may yet hope to gather into the fold. The substance of the book before us formed the basis of certain lectures addressed to popular audiences, and is well suited, with the accompanying illustrations, to arouse the attention of the indifferent and of that very large class of persons who go through the world with their eyes shut.

Two of the lectures, those on "Flowers," have been previously published. They contain references to the relationships between insects and flowers, to the visitations of the former to the latter, and other cognate matters with which the reading public has been familiarised. We need therefore only allude to the remaining chapters, treating of "Fruits and Seeds" and of "Leaves." The terms are throughout used in their popular and not in their strict technical acceptation, a circumstance which at once brings under notice the very different means by which the same effect or purpose is fulfilled. The general reader concerns himself far more with results than with the way in which they are brought about, and hence he sees no incongruity in grouping the winged flower-stalk of the lime, the "keys" of the ash or the maple, and the winged seed of the pine under one and the same heading.

Sir John humours this tendency. Probably he feels that the majority would be repelled by morphological disquisitions, genealogical dissertations, and transcendental speculations. These things come after. For the present the author dilates upon the form and appearance of the fruit and seed in relation to the necessities of their life and the purpose of their existence. He thus points out, on the one hand, the modifications and adaptations to secure adequate protection for the seed from the vicissitudes to which it is exposed, and, on the other, the divers means by which the dispersion of the seed is effected and its germination facilitated. Similarly, in the case of the leaves, the author discusses the probable causes of the exuberant variation met with in these organs. Whatever the cause, the result is doubtless consistent with the principle expressed by "the greatest happiness of the greatest number," the co-relations and adaptations met with secure the maximum of advantage

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possible to each leaf with the least interference with the requirements of neighbouring leaves. It is not often we should be disposed to cite Mr. Ruskin as an authority on botanical matters, but in the fifth volume of his "Modern Painters" he has to some extent anticipated Sir John, and given some striking illustrations of the mutual adjustments between the several leaves on the same branch.

The protection possibly afforded by the close resemblance of one plant (unprovided with other means of defence) to another duly equipped with defensive armour was not thought of in pre-Darwinian days. Sir John Lubbock in the volume before us gives several illustrations of the phenomenon which, whether we accept the explanation or not, are very striking. Attention is also called to the primordial leaves which succeed to the cotyledons or seed-leaves. In many cases, as in conifers and in most compound-leaved plants, the form of these adolescent leaves differs widely from that of the adult foliage. From these circumstances the obvious inference is drawn that plants with lobed or compound leaves are derivatives from ancestors that had leaves of simpler type. The seedling plant in such cases is assumed to repeat the form and appearance of its ancestors. If this inference is taken in a general sense, and not made too exclusive in its application, it will meet with general acceptance. But we do not think that we are entitled to assume direct genetic connection in all such cases. Of necessity simple leaves must precede divided or compound ones. Similarity of conditions and requirements would bring about, in the case of archaic and of recent plants respectively, similarities of form without any necessary direct hereditary connection between the two.

A few slips may be mentioned for correction in the next edition; thus, it is hardly correct to describe the leaves of *Desmodium gyrans* as perpetually moving round (p. 49); Stael (p. 114) should be Stahl; and the reference (at p. 93) to "Mr. Moore" requires further differentiation, as there are several Moores known to botanists. In this case Spencer Le Marchant Moore is probably intended.

We have said enough to show what varied sources of interest are opened up by Sir John Lubbock in this book. We trust that in future we may have further discussions of like nature from his pen, and we might suggest to him, as a complement to what he has here given us, a chapter on the significance of the various modifications of leaf-arrangement met with in Buds.

MAXWELL T. MASTERS

THE GEOLOGY OF PALESTINE

Memoir on the Physical Geology and Geography of Arabia Petrea, Palestine, and Adjoining Districts. By Edward Hull, F.R.S. (Under the auspices of the Committee of the Palestine Exploration Fund. 1886.)

MUCH has been written in recent years regarding the geology and natural history of that deeply interesting region which lies to the east of the Gulf of Suez, and includes the Basin of the Jordan River. Yet much still remains for further exploration, more especially in the way of more accurate detail and of connected analysis of the whole region. Recognising this deficiency of information, the Committee of the Palestine Explora-

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tion Fund towards the close of the year 1883 organised an expedition for the purpose of making a geological survey, or rather reconnaissance, of Western Palestine, and intrusted its conduct to Prof. E. Hull of the Geological Survey. The Report of this expedition is now issued as a handsome quarto volume of 145 pp., with maps and numerous woodcuts. Part I. gives an enumeration of the more important or accessible writings of previous observers, and a description of the physical features of the districts visited. Part II. deals with the geological structure of Arabia Petraea and Palestine, including the Archæan crystalline rocks, and the Carboniferous, Cretaceous, Tertiary, and Post-Tertiary formations. Part III. contains a brief account of the Tertiary Volcanic Rocks. Part IV. is devoted to a discussion of the dynamical operations which may have brought about the present geological structure of the region, and of the evidence of former differences of climate. Part V. treats of the origin of the saltiness of the Dead Sea and of the recent climatal changes of that district. The scheme of treatment is thus comprehensive enough, and the details and conclusions are clearly expressed, though they hardly add as much as could have been hoped to what was already known on the subject. The discussion of the dynamical questions is disappointingly meagre. In the problem of the origin of the great Jordan Valley depression there was room for much detailed exposition, wherein a careful collection of the facts of geological structure could have been made conducive to a valuable addition to our knowledge of this important and still obscure branch of geological physics. The history of the surface-features of the region of Western Palestine is a question on which the Report throws very little fresh light, though it is the one to which perhaps above all others the members of a flying corps of observation might have been expected to be able to contribute valuable data. Regarding the changes of climate and the origin of the Dead Sea we should have looked for more new materials and a much fuller discussion than the few paragraphs in which this important subject is dismissed. No doubt Prof. Hull and his companions did as much in the way of observation during their brief visit as was possible in the time, and he has made all that probably could be made of it in this Report. But we are inclined to think that the subject was in such a position that little further could be usefully done to it by the rapid journey even of a trained observer through the country. If the Committee of the Palestine Exploration Fund want to have a satisfactory solution of the many profoundly interesting geological problems presented by Syria and Palestine, they must organise the task as part of the less rapid and more detailed survey of the general topography. The Report is excellently printed and illustrated, the maps being of especial value, containing as they do a summary of all that is known up to the present time regarding the distribution of the rocks in Palestine. There are some errors of the press which on revision the author will no doubt correct in another edition, and we would call his attention to a sentence which betrays his nationality, "The Patriarch Job, whether an actual person or a representative character, may be supposed to have inhabited the Plains of Edom" (p. 123).

A MANUAL OF CHEMISTRY

A Short Manual of Chemistry. Vol. I. "Inorganic Chemistry." By A. Dupré, Ph.D., F.R.S., F.C.S., &c., and H. Wilson Hake, Ph.D., F.C.S., F.I.C. (London: Charles Griffin and Co., 1886.)

"WHY should another hand-book on this subject be added to the many which already exist in the language?" In the first paragraph of their preface the authors anticipate the possibility of this question arising in the minds of some chemists, and they therefore answer it by (1) claiming their right, as teachers of lengthened experience, to record their methods of instruction; and (2) expressing their belief "that the very multiplicity of text-books already published tends to show a want felt, but not yet satisfied."

Their method consists in first laying down general principles which, when thoroughly mastered, are to be followed up with the facts of descriptive chemistry.

The introductory chapters containing these general principles, on which the student "with no previous knowledge of chemistry whatever" is to found his chemical education, comprise about 80 pages of the book, and since the authors lay so much stress on their importance, we cannot pass over this portion of the book without giving a few illustrations of what is to be learnt from the manual apparently intended to supersede all other text-books.

The representation of a molecule by two small circles surrounded by a larger circle (see note on p. 11) may perhaps be mentioned as an instance of the pertinacity with which so many teachers continue to do their best to confuse their pupils with erroneous conceptions of atoms and molecules.

On p. 36 the melting-point of a substance is incorrectly defined as "the temperature at which it is no longer capable of existing as a solid." On p. 37 it is stated that "most substances increase in volume on melting, but some decrease. In the case of the former the effect of pressure is to lower, in the latter to raise, the melting-point." Thomson proved the opposite of this to be the case.

The statement generally found in text-books that a ray of light passing from a rarer to a denser medium is refracted towards the perpendicular, and *vice versa*, is reproduced on p. 42. If the authors are employing the word *dense* in the optical sense, we think they should say so, if in the ordinary sense, the statement is incorrect.

On p. 43 they describe *total reflection* as taking place when "a ray of light proceeding from a denser to a rarer medium strikes the surface, separating the two media at such an angle that the refracted ray would form a right angle (or any greater angle) with the reflected ray." We would like to know the authority for this curious statement.

On pp. 64 and 65 is a table headed "Table of Symbols, Atomic and Molecular Weights, and Valency of the Elements." It contains a list of all the elements, including those most recently discovered, norwegium amongst the rest, though the existence of the latter metal cannot be said to have been satisfactorily demonstrated. The columns to which we more particularly call attention are, however, those headed "molecular symbol, showing number of atoms in the molecule," and "molecular